Variable step size block method for solving directly third order ordinary differential equations.

ABSTRACT

In this study, a two point implicit block direct integration method is derived for solving directly the third order ordinary differential equations (ODEs). This method will estimate the solutions of initial value problems at two points simultaneously on the x-axis using variable step size. The existence multistep method involves the computations of the divided differences and integration coefficients in the code when using variable step size or variable step size and order. The proposed block method will be presented in a simple form as the Adams Moulton method and the code will store all the constant coefficients of the method. The purpose of the storage is to avoid the computations of the divided differences and the integration coefficients that can be very costly. Although the method is in a simple form but we intend for efficiency and economically. Numerical results were given to compare the efficiency of the developed method in terms of total number of steps, function calls, maximum error and execution times. The results suggested a significant improvement of the proposed method over the existing non-block method.

Keyword: Third order ordinary differential equations; Direct block method; Adams Moulton method.